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ATLAS OF MARS 1:1,000,000 GEOLOGIC SERIES CHRYSE REGION M 1M 20/34 G, 1976

SUMMARY The Chryse region (named "Land of Gold" by Schiaparelli in 1877) lies along the boundary between the heavily cratered ancient southern highlands of Mars and the lightly cratered, younger northern lowlands The plateau materials of the upland margin in this area are comprised of smooth intercrater deposits which display faint flow fronts; island outliers appear layered. These materials probably represent lava flows (Wilhelms, 1976) which mask and bury the older impact cratered (knobby) terrain; alternatively, they may be fluidized ejecta

blankets, as suggested for upland plains on the Moon (Oberbeck The largest channel complex on the planet (Masursky, 1973; Sharp and Malin, 1974) has deeply dissected the highland margin in this area; the prime Viking landing site lies at the mouth of this channel complex. where three of the channels converge. The channels dissect the ancient cratered terrain and plateau materials in a complex of anastamosing valleys. Within the interchannel areas, "island" outliers of plateau material display complex polygonal forms with elongate "downstream" tails to the north. These islands strongly resemble terrestrial features associated with stream dissection and deposition (Ingerson and Baker, 1976; Boothroyd et al. 1976); their shapes may also have been modified by wind erosion. If the channels were indeed tormed by flowing water, the landing site lies on the piedmont alluvial slope

of the channel system. The channel floors are smooth at about 100 meter resolution and do not exhibit the complex braided patterns visible on the floors of channels in other Martian areas (Milton, 1972; Masursky, 1973, 1976); younger sediments may mask these ancient channel floors. The younger deposits may be composed of silt and clay materials that filled the channel in the closing phases of large floods, or may be composed of later blankets of wind blown colian material. The southeast part of Chryse Planitia, located in the northwestern part of the map, is a smooth, low plain. A few small craters, with light streaks to leeward (west) of the craters, break the otherwise featureless appearance of the unit. The light streaks, described as wind streaks or tails (Sagan et al, 1972; Soderblom et al, 1973) imply that colian processes have been active. Radar spectra obtained in 1967 (Carpenter, 1967) indicate that the northeastern section of the map is relatively smooth; the root mean square (RMS) slopes (Moore et al, 1975) are about 3°. To the northwest, in the central part of Chryse Planitia, the RMS slopes increase to 5-6°. The latter measurements are similar to RMS slopes measured in sand dunes near Yuma, Arizona) (Wu, informal communication). Regional relationships in this map area suggest that sand dunes may have formed on the apparently smooth floor of Chryse Planitia where the finer-grained

reworked by the wind. GEOLOGIC HISTORY The knobby terrain records the earliest episode of intense cratering of a preumably differentiated crust. These ancient crustal rocks appear to be similar to the ancient lunar highland materials (Taylor et al, 1973) and therefore may be noritic or anorthositic in composition. In this area of Mars, subsequent extrusions of volcanic materials, or impact ejecta, covered most of the ancient croded upland terrain, filling and smoothing the areas between the ancient craters and masking all but a few remnants of deeply eroded intercrater highland material. This smooth plateau surface slopes gently to the north, where it was overlapped by northern plains materials that comprise the floor of Vastitas Borealis and other low, northern plains like Chryse and Acidalia Planitiae. The northern plains areas may have been covered by basaltic lava flows similar in composition to those which floor the terrestrial ocean basins or comprise the lunar mare deposits. The highly irregular border between the northern highlands and southern lowlands (the fretted terrain of Sharp, 1973) became eroded, then partially flooded by northern volcanic flows. In this map area, the border has been deeply dissected by channels that originate in areas of collapsed terrain: Hydraotes, Hydaspis and Aram Chaos. These collapsed areas may have developed during several episodes of warmer climatic conditions; alternatively, they may have developed when geothermal heating associated with volcanism in the Tharsis-Syria-Sinai plateau melted subsurface ice. Subsequent ubiquitous deposits of colian materials now blanket the plains and older channelled deposits. Most of the light and dark streaks are products of the great dust storm of 1971, when previously deposited eolian materials were reworked by the wind (Sagan, et al, 1972;

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